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INST
Rev. 2
10/7/2015

Bearing & Bushing
Portable Roller Swaging Tool
Instructions



SUBJECT
BEARING & BUSHING PORTABLE ROLLER SWAGING TOOL INSTRUCTIONS

REPORT
INST
REV. 2
10/7/2015

DETAILS OF REVISIONS

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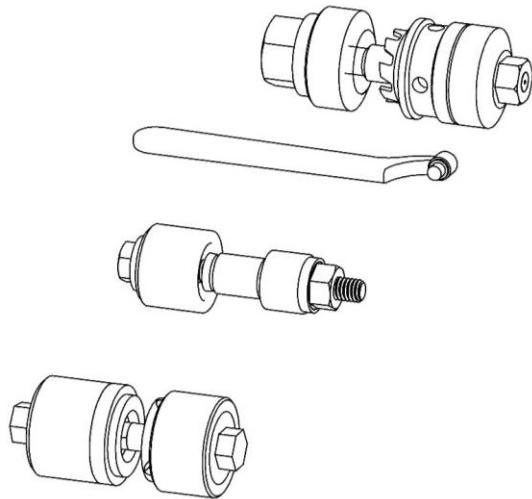
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Section 1.0: Introduction

1.1 PURPOSE:

Dart Aerospace Portable Swaging Tools have been designed to remove and install swaged bearings. The purpose of this document is to provide the customer with a detailed set of instructions necessary to complete the removal and installation of swaged bearings.



1.2 ORDER OF PRECEDENCE:

In the event of a conflict between this text and the Airframes Manufacturing Procedures, the Airframes Manufacturing Procedures take precedence.



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Section 2.0: Instructions

2.1 BEARING REMOVAL PROCEDURE:

Where the housing material is 150 KSI UTS or more, the swaged bearing may be pressed out without the use of a cutting tool. Where the housing material is less than 150 KSI UTS, the following procedure shall be used to prevent damage to the housing. Only one swaged side of the Bearing will need to be cut.

- 2.1.1 Select the proper Portable Swaged Bearing Cutter Tool. Check the condition of the tool. If it is damaged, severely worn, or there are dull or missing teeth, replace the tool.
- 2.1.2 Refer to Figure 1: Remove the Flange Nut and Seat from the tool. Place the Portable Bearing Cutter Shaft through the Bearing, carefully align the cutting teeth within the swaged bearing's lip and hold in place.
- 2.1.3 Place the Portable Bearing Cutter Seat and Flange Nut on the Shaft extending from opposite side of the bearing. Tighten the Flange Nut while aligning the Seat with the opposite swaged bearing's lip until snug.
- 2.1.4 Tighten the Portable Bearing Cutter Spring Tensioner Nut and/or the Flange Nut until an adequate amount of pressure is placed on the cutting teeth. Only a small amount of pressure should be necessary. Be sure that the cutting teeth are within the swaged bearing's lip, at approximately the same diameter as the bearing before swaging occurred. Place the Portable Bearing Cutter Spanner Wrench onto the Cutter Head and rotate clockwise to begin cutting a groove in the swaged bearing's lip. Continue rotating the Cutter head until the groove has cut through approximately 80% of the bearing's swaged lip. Exercise extreme care not to cut completely through the bearing lip to prevent damaging the Bearing Housing.
- 2.1.5 Select the proper Portable Bearing Install and Removal Tool. Check the condition of the tool. If damaged or severely worn, replace the tool.
- 2.1.6 Press the bearing out of the housing with the Removal part of the Tool per Figure 2. Discard the old bearing as it cannot be used again.



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2.2 PRIOR TO BEARING INSTALLATION:

- 2.2.1 Inspect for proper part numbers on bearing and housing per engineering drawing. Clean housing bore as necessary to remove all foreign particles, corrosion, and contamination prior to installing the bearing. Check the Bearing Housing bore and chamfers to ensure there are no burrs or damage. If the Housing is damaged, it cannot be used.
- 2.2.2 Check the bearing to assure that it is clean and free from contamination. If the bearing requires cleaning, clean as necessary following the manufacturer's recommendations. Re-lubricate metal-to-metal bearings with the appropriate grease as required by the bearing drawing. Do not lubricate self-Lubricated bearings.
- 2.2.3 Apply the proper corrosion protection coating to the housing bore and/or bearing O.D., prior to installing the bearing, as required by the applicable finish specifications and MIL-STD-1599, Requirement 105. Do not install bearings wet with corrosion protection where corrosion protection could interfere with re-lubrication provisions. After installation and swaging such bearings, the bearing to housing interface shall be coated with corrosion protection as required by the applicable finish specifications. If passages are provided to re-lubricate metal-to-metal bearings, verify they are open.

2.3 BEARING INSTALLATION:

- 2.3.1 Select the proper Portable Bearing Installation Tool. Check the condition of the tool. If damaged or severely worn, replace the tool.
- 2.3.2 Press the bearing into the housing taking care to assure that the bearing is straight and not canted to the housing bore during insertion per Figure 3. Check to assure the bearing is not canted in the housing and that the bearing will rotate within the torque limits specified on the engineering drawing.
- 2.3.3 If an interference fit exists between the bearing and the housing bore, take extreme care in aligning the bearing with the housing bore prior to pressing it into the housing. Bearings that are canted while pressing into the housing are easily deformed.



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2.4 BEARING INSTALLATION:

- 2.4.1 Select the proper Portable Bearing Swaging Tool. Check the condition of the tool. If damaged or severely worn, replace the tool. Check the Swaging Tool's bronze Roller Carriage and Rollers. The Carriage must be slightly loose and the Rollers must turn freely. Adjustments can be made by turning the lock nut inside the Swaging Assembly per Figure 4.
- 2.4.2 Check the assembly to assure the bearing is properly centered in the housing.
- 2.4.3 Separate the Portable Bearing Swaging Tool's three main parts, the Tensioner Assembly, Seat, and the Swaging Assembly per Figure 4. Place the Seat into the Tensioner Assembly housing with the Primary side facing out.
- 2.4.4 Apply a thin coat of light lubricant to the bearing groove to prevent galling, if required. Put the Swaging Assembly Shaft through the bearing, align the Swaging Assembly three Roller edges with the bearing groove, and place against the bearing and hold in place. Put the Tensioner Assembly and Seat (with the Primary side out) onto the swaging Assembly shaft that sticks out of the bearing's other side. Align the Tensioner Assembly Guide Pin with the flat surface on the Swaging Assembly Shaft and tighten the Tensioner Assembly Nut until sufficient pressure is achieved to start the swaging procedure per Figure 5.
- 2.4.5 Rotate the Swaging Assembly by the Nut Cap in a clockwise rotation only (counter-clockwise will loosen the cap and possibly the shaft locknut). Rotate the Swaging Assembly continuously, occasionally tightening the Tensioner Nut to keep sufficient pressure applied to the bearing groove lip for swaging.

NOTE: Roller swaging requires a relatively light load compared to anvil swaging. There are no tabulated swaging loads for using the Portable Swaging tool. Use minimal swaging force necessary to meet requirements and avoid lip or housing damage. Variations in groove dimensions and bearing race material hardness can cause the swaging load or duration of application to vary. In most instances, the operator of the Portable Roller Swaging Tool will develop a sense of the load and duration of application needed for proper bearing swaging after a few operations, with these tools.

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- 2.4.6 Continue process step 2.4.5 while visually checking the amount of material swaged until proper swaging has been achieved per Figure 6. If it is a flanged bearing being swaged, with a groove on one side only, skip step 2.4.7 and move on to step 2.4.8.
- 2.4.7 Remove the Portable Roller Swaging Tool from the bearing and housing. Reverse the Seat so that the Secondary side is away from the Tensioner Assembly Housing. Repeat steps 2.4.4 through 2.4.6, making sure that the Secondary side of the Seat aligns with the previously swaged groove of the bearing.
- 2.4.8 After swaging is completed on each side of the bearing and housing, visually determine that the lips have been swaged over the housing properly and check the edge gap as shown in Figure 6. Re-swage, if necessary, at higher swaging loads until the edge gap condition is met. Inspect each swaged lip for damage such as cracks, chips, galling, etc.

Section 3.0: Figures

Figure 1 – RBC##P BEARING CUTTER:

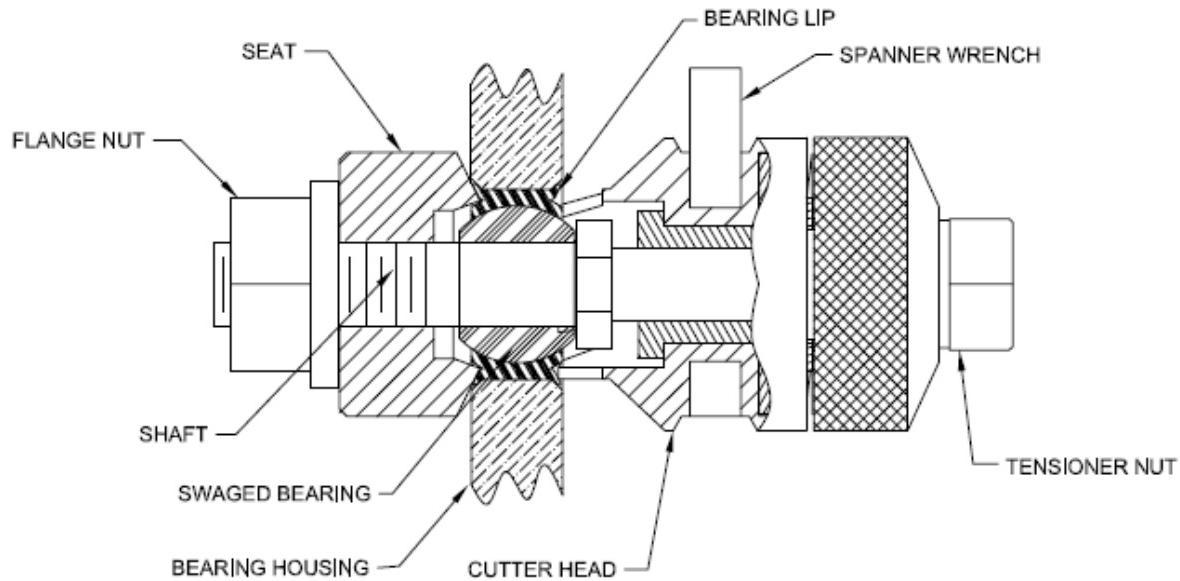


Figure 2 – RBIR## BEARING INSTALL & REMOVAL TOOL:

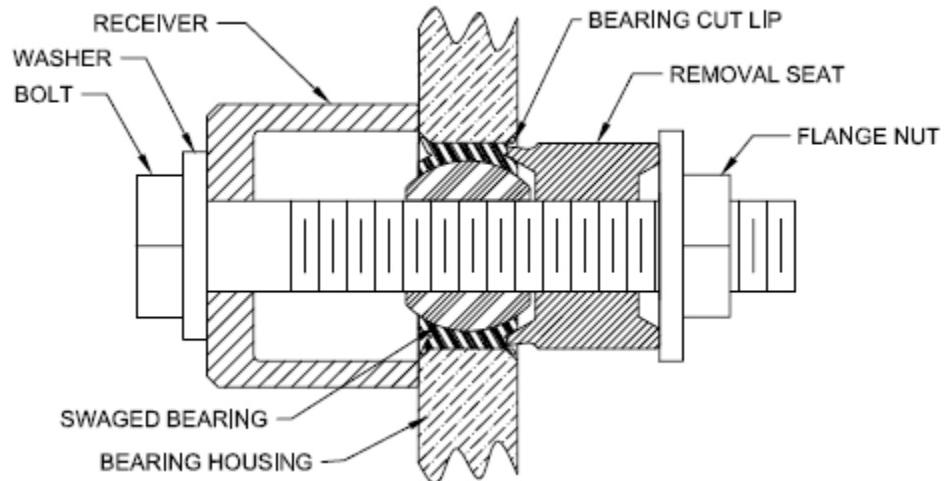


Figure 3 – RBIR## BEARING INSTALL & REMOVAL TOOL:

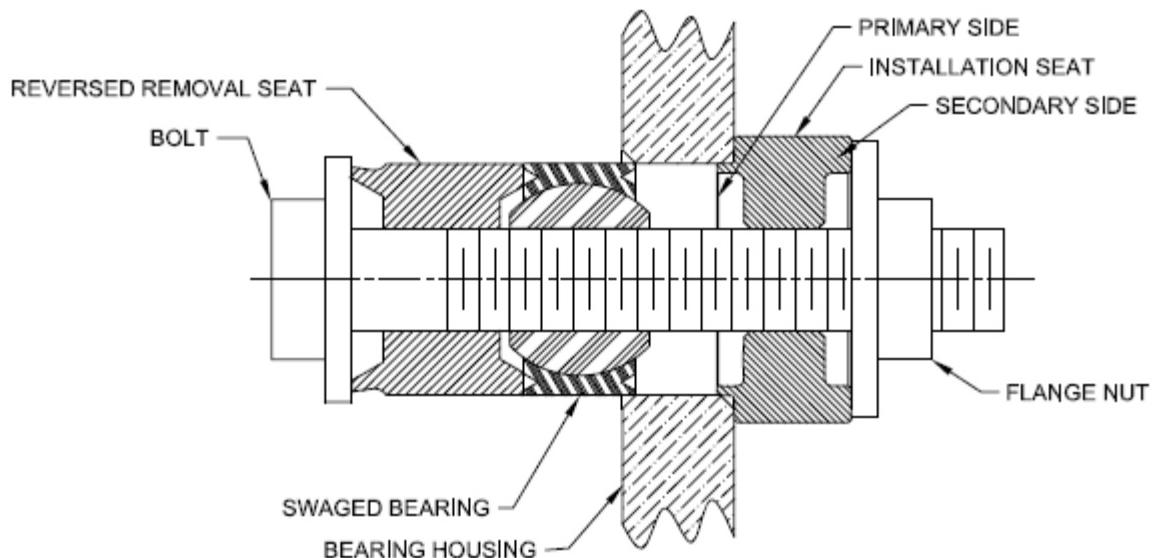


Figure 4 – RBST##P PORTABLE BEARING SWAGING TOOL:

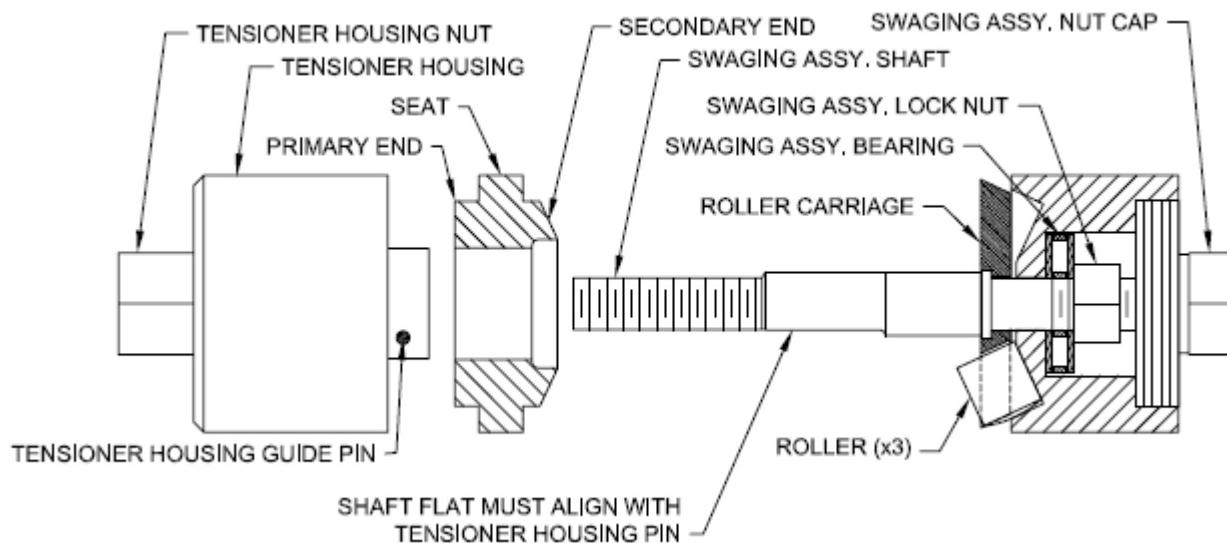


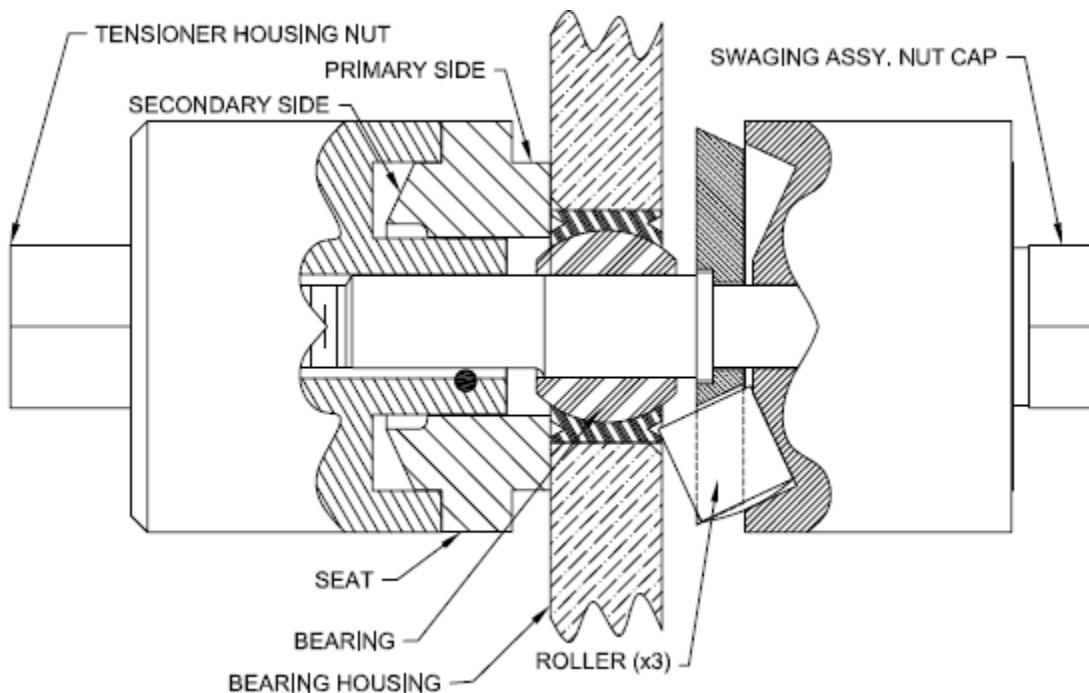
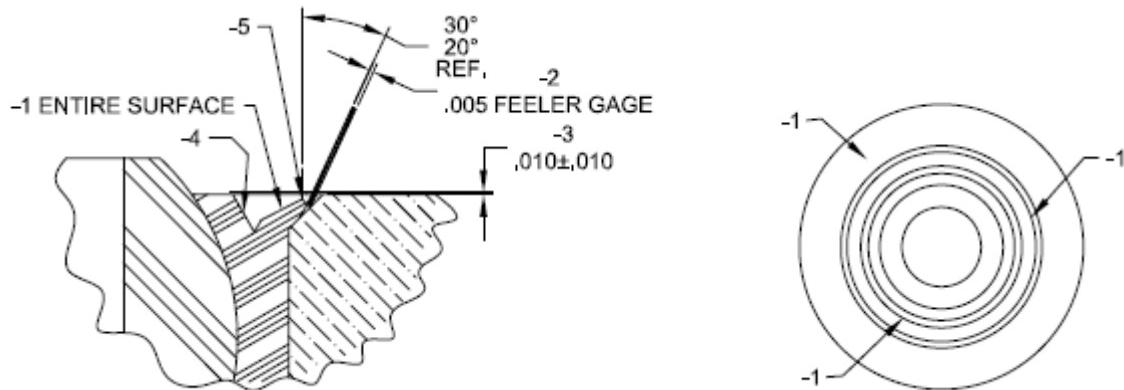
Figure 5 – RBST##P PORTABLE BEARING SWAGING TOOL (OPERATION):

Figure 6 – INSPECTION:



INSPECTION OF SWAGED V-GROOVED BEARINGS AS FOLLOWS:

- 1 Visually inspect this circumferential area for cracks and separation.
- 2 Inspect circumference of the gap in the swaged lip as shown with .005 in. feeler gauge. A properly swaged bearing in an optimally prepared housing will not accept the feeler gauge, however, no more than 40% of the circumference may accept the gauge. Inspect while installation treatment is uncured.
- 3 Bearing race face to be flush with housing within $\pm .010$ in.
- 4 Visually inspect the inner face of the bearing groove to assure there is no evidence of roller contact during the swaging operation.
- 5 Visually inspect the swaged portion of the swaged lip to assure that over-swaging has not occurred.